CLAIMS:

1.   A method of storing data captured from a digital communications network, for processing, said captured data comprising a stream of messages having message parameters, said stream of messages comprising messages of a plurality of communications sessions, the method comprising:

inputting data from said stream of messages;

writing, for sequential ones of said said stream of messages, sequential sets of parameters into a first FIFO (first-in first out) data structure, at an entry point of said first FIFO data structure;

reading said sequential sets of parameters from an exit point of said first FIFO data structure; and

writing sequential sets of parameters read from said first FIFO data structure into a second data structure; and

wherein said entry point and said exit point are separated by a first data structure length; and wherein said first data structure length has a predetermined minimum value defined in terms of a number of said sets of parameters and/or a time between said writing of a said set of parameters into said first data structure and said reading of a said set of parameters from said first data structure.

2.   A method as claimed in claim 1 wherein said second data structure comprises a FIFO data structure.

3.   A method as claimed in claim 1 or 2 wherein said length defines a predetermined minimum time between a said set of parameters being written into and read from said first FIFO data structure.

4.   A method as claimed in claim 3 wherein a message rate of said stream of messages varies, and wherein said first FIFO data structure stores a variable number of said sets of parameters.

43

5.   A method as claimed in claim 1, 2, 3 or 4 comprising effectively moving said captured data through a plurality of chained FIFO data structures at least some of which have a respective predetermined minimum length.

6.   A method as claimed in any one of claims 1 to 5 wherein at least one of said first and second data structures includes a last value data store to store a previous value of one or more of said parameters, the method further including updating said last value data store when one or more said sets of parameters is written into said first FIFO data structure.

7.   A method as claimed in claim 6 wherein at least one of said first and second data structures includes a plurality of said last value data stores to store a plurality of most recent previous values of one or more of said parameters for a corresponding plurality of said communications sessions, the method further comprising:

identifying a communications session to which a said set of parameters belongs; and

updating a last value data store for said communications session when one or more said sets of parameters is written into said first FIFO data structure.

8.   A method as claimed in claim 7 wherein said identifying comprises reading parameter data from said first data structure and writing session identification data into said first data structure, wherein said second data structure includes said plurality of least value data stores, and wherein said updating a last value data store for said communications session includes reading said session identification data to identify a said last value data store to update.

9.   A method as claimed in any one of claims 1 to 8 wherein said first and second data structures each comprise a sequential plurality of storage blocks, each storage block having a plurality of storage elements, one for each of a superset of said sets of parameters comprising a set of all parameters selected for storage.

10.   A method of processing data captured from a digital communications network using first and second processing operations, said second processing operation being

44

dependent upon a result of said first processing operation, a result of said first processing operating requiring a minimum delay for validation, the method comprising storing said captured data as claimed in any one of claims 1 to 9 and in parallel:

reading data from said first data structure, operating on said read data using said first processing operation, and writing a result of said first processing operation to said first data structure; and

reading data from said second data structure, and operating on said read data using said second processing operation.

11. A method as claimed in any preceding claim further comprising combining and/or selectively discarding ones of said sets of parameters between reading from said first FIFO data structure and writing to said second data structure.

12. A method as claimed in claim 11 wherein said network comprises a digital mobile phone network, and wherein said messages selectively discarded messages comprise measurement messages.

13. Computer program code to, when running, implement the method of any preceding claim.

14. A carrier carrying the computer program code of claim 13.

15. A system for processing data captured from a digital communications network to provide output data, the system comprising:

a data pipe configured to store said captured data as a time-ordered sequence, said data pipe having at least a first region and a second region, said second region corresponding to earlier times than said first region;

at least one first listener attached to said first region of said data pipe;

at least one second listener attached to said second region of said data pipe; and

wherein said a first listener is configured to read input data from said data pipe and to write first listener output data determined from said input data back to said data pipe, wherein at least some of said first listener output data is not valid until after a delay;

45

wherein a said second listener is configured to read second listener input data including said first listener output data from said data pipe, and to provide output data determined from said read second listener input data;

and wherein a start of said second region of said data pipe is earlier than a start of said first region of said data pipe by at least said delay.

16.   A system as claimed in claim 15 wherein said delay corresponds to a time interval; wherein a rate of captured data storage into said data pipe is variable; and wherein a length of said first region is variable.

17.   A system as claimed in claim 15 or 16 comprising a plurality of said first listeners.

18.   A system as claimed in claim 17 wherein said first listener output data from one or more of said first listeners is dependent upon first listener output data from one or more others of said first listeners thereby defining a first listener dependency; and wherein said first listeners are configured to operate in accordance with said first listener dependency.

19.   A system as claimed in any one of claims 15 to 18 wherein said captured data comprises a stream of messages having message parameters and including messages of a plurality of communications sessions, at least some of said messages including session-identifying parameters.

20.   A system as claimed in claim 19 wherein said at least one first listener includes a listener to identify a said session and to write session identity data to said data pipe.

21.   A system as claimed in claim 19 or 20 further comprising a plurality data buckets associated with at least one of said first and second data pipe regions, each bucket corresponding to a said communications session and being configured to store one or more previous values of said message parameters for a said session.

22.   Computer program code, in particular on a carrier, to implement the system of any one of claims 15 to 21.

23.   Computer program code for processing data captured from a digital communications network, said captured data comprising a stream of messages, ones of said messages including message parameters, said stream of messages comprising messages of a plurality of communications sessions, the code comprising:

a first FIFO module having an input for receiving message parameter data from said stream of messages and an output;

a second FIFO module having an input coupled to said first FIFO module output; and

wherein said message stream has a variable rate and wherein said first FIFO module is configured to guarantee a time delay between said first FIFO input and said first FIFO output of at least a minimum value.

24.   Computer program code as claimed in claim 23 further comprising a first data processing module coupled to said first FIFO module to read data from and to write processed data to said first FIFO module, and a second data processing module coupled to said second FIFO module to read data from said second FIFO module, wherein said second data processing module is configured to read said processed data from said first data processing module, and wherein said processed data is only valid after at least said minimum time delay value.

25.   Computer program code as claimed in claim 24 wherein said processed data includes session discrimination data.

26.   Computer program code as claimed in claim 25 wherein said second FIFO module has a plurality of associated data storage modules corresponding to a plurality of discriminated sessions, and wherein said code is configured to store message parameter data in a selected said data storage module responsive to said session discrimination data.

47

27.	Computer program code, for processing data captured from a digital communications network, said captured data comprising a stream of messages having message parameters, said stream of messages comprising messages of a plurality of communications sessions, the code comprising:

a first FIFO module having an input for receiving message parameter data from said stream of messages and an output;

a second data processing module, in particular a FIFO module, having an input coupled to said first FIFO module output; and

a data culling module coupled between said first FIFO output and said second data processing module input to reduce a rate of data processed by said second data processing module compared with said first FIFO module.

28.	Computer program code as claimed in claim 27 further comprising a message labelling module coupled to said first FIFO module to label messages for culling by said data culling module.

29.	Computer program code as claimed in claim 27 or 28 further comprising a session discrimination module, and a plurality of storage modules responsive to said discrimination module each to selectively store message parameters for a said communication session.

30.	A method of processing data captured from a digital mobile communications network, the data comprising a stream of messages relating to a plurality of entities of said network, the method comprising identifying and labelling data relating to unwanted messages; and subsequently reading said labelling and culling said data relating to unwanted messages.

31.	Computer program code, in particular on a carrier, to when running implement the method of claim 30.

32.	A method of defining a data storage structure, the data storage structure comprising one or more FIFO structures coupled in series, at least one of which has a

48

guaranteed minimum length, one or more data processing modules being couplable to each said FIFO structure to receive data from the structure, the method comprising:

inputting a required parameter set;

determining a set of data processing modules required to provide said required parameter set, one or more of said modules having a minimum required time for a valid output, others of said modules being dependent upon a said valid output; and

positioning said data processing modules on a said data storage structure to define a said structure in which a said FIFO with a guaranteed minimum length is defined by a said module with a minimum output validation time, and a subsequent series coupled FIFO is defined by a said module dependent upon said valid output.

33.   Computer program code, in particular on a carrier, to when running implement the method of claim 32.

34.   A method of storing data captured from a digital communications network for processing, said captured data comprising a stream of messages having message parameters, said stream of messages comprising messages of a plurality of communications sessions, the method comprising:

inputting a said message of said stream;

writing a set of parameters from the message into a FIFO data structure

identifying a communications session to which the message belongs; and

updating a last value data store associated with the communications session with parameters of a previous message of the session.

35.   A method of processing data stored according to claim 34, the method comprising determining, for a said communications session, a current value and a last value of one or more of said parameters, from a current message and a said last value data store, and processing said current and last value to provide an output value.

36.   A method of processing data as claimed in claim 35 wherein said communications session involves an entity of said network, and wherein said output value comprises an estimated state of said entity.

37. Computer program code, in particular on a carrier, to when running implement the method of any one of claims 34 to 36.

38. Computer program code for storing data captured from a digital communications network for processing, said captured data comprising a stream of messages having message parameters, said stream of messages comprising messages of a plurality of communications sessions, the code comprising:

a buffer module to sequentially store said messages;

a discriminator module to associate said message with a communications session; and

a bucket module, responsive to said discriminator module to store a most recent previous value for one or more of said message parameters for each of a plurality of said communications sessions.

39. A method of modelling a plurality of communications sessions or network entities substantially in parallel using data captured from a digital communications network, said captured data comprising a stream of messages having message parameters, said stream of messages comprising messages of a plurality of communications sessions, a said communications session comprising messages communicated by or to a said network entity, the method comprising:

storing, for each said session or entity, a most recent previous value for a parameter set comprising one or more of said parameters;

determining, for a current message, a communications session or entity to which the message belongs;

determining one or more current parameter values from said current message;

updating a state model for said communications session or entity to which the message belongs using said one or more current values and said most recent previous parameter set value for said communications session or entity;

updating said most recent previous value parameter set using said one or more current parameter values; and

repeating said determining and updating to model said plurality of communications sessions or network entities using a parallel bank of said state models, one for each said session or entity.

50

40.　　A method as claimed in claim 39 wherein said plurality of network entities comprise a plurality of instantiations of a single type of network entity.

41.　　Computer program code, in particular on a carrier, to when running implement the method of claim 39 or 40.